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SECOND ANNUAL REPORT

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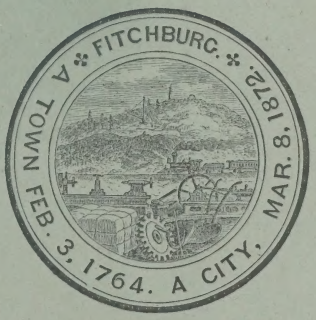
OF THE

JUL 3 1916

Water Commissioners,

OF THE

CITY OF FITCHBURG.



FITCHBURG:
PRINTED AT THE OFFICE OF HENRY F. PIPER,
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REPORT.

WATER COMMISSIONERS' OFFICE,
Fitchburg, Dec. 10, 1874.

To the City Council:

In accordance with the provisions of the "Ordinance in relation to the Water Department," the undersigned herewith submit the Fifth Annual Report.

STABILITY OF OVERLOOK DAMS.

In that portion of the Report of the City Engineer of last year, which refers to the Water Works, it is asserted that he (the Engineer), had known of leaks existing at the reservoir dams since water was first let upon them, and in consequence of that fact he, with the approval of the Joint Standing Committee on Water, investigated the subject and gave a table showing the amount of water flowing over four different weirs from the latter part of June until December. He says, "by reference to the above table, it will be noticed that as the depth of water in the reservoir decreased, the quantity flowing over the weir at each dam diminished, and as the depth increased in October and November, the flow at the weirs increased, indicating that the outflow depended upon the head in the reservoir."

May 22, we received a communication from the Engineer, which on the 26th was transmitted to the Council in the following:

WATER COMMISSIONERS' OFFICE,
Fitchburg, May 25, 1874.

To the City Council:

On the 22d inst., simultaneously with a similar notice to the public through the daily papers, the Water Commissioners received from the City Engineer a communication of which the following is a copy:

CITY ENGINEER'S OFFICE,
Fitchburg, May 22, 1874.

To the Water Commissioners of Fitchburg:

Gentlemen:—Overlook Reservoir is, in my opinion, in an unsafe condition. During the present month several unfavorable changes have taken place at the south dam. The changes, the last few days, have been especially noticeable, and of a seemingly dangerous character. The matter is one of such serious import as to demand immediate attention. As City Engineer I have no control of matters in the Water Department and give you this notice as my only duty in the matter.

Respectfully yours,
GEORGE RAYMOND,
City Engineer.

After careful re-examination of the conditions appertaining to Overlook, we are unable to share in any degree the fears of the Engineer; but from his position and the confidence in his judgment which is entertained by others, we deem it essential and hereby ask, in order to calm the excitement which exists in a portion of the public mind, that a commission of experts whose opinions will be accepted as authoritative by every one should be employed to examine our Water Works, with authority to make an exhaustive investigation of the plans, modes of construction, qualities of material and work and the present condition of the same, to the end that whatever is faulty in any degree may be known and suitable remedies provided, and, also that many foolish, impossible and,

in view of the present excitable condition of the people's minds, criminal stories that are circulated may be at once and forever set at rest.

JABEZ FISHER,
LUCIUS ALDRICH,
STEPHEN SHEPLEY,
} *Water Commissioners.*

This communication and request was referred by the council to the Joint Standing Committee on Water, with full powers. A meeting was arranged for June 16th, at which Mr. James B. Francis, the eminent engineer of Lowell, was employed by the committee as an expert whose opinion was to be given after a hearing. A view of the dams was taken during the forenoon, and various persons gave opinions and statements, not however under oath, in the afternoon. The points as put forth by the City Engineer were as follows:

He had never had faith in the security of these dams, and had therefore watched them somewhat closely, and especially after the breaking away of the dam at Mill River, on the 16th of May, he was led to re-examine the south dam. He then found the water boiling up at a point above the weir in such a way that he was alarmed and feared a sudden catastrophe. The Commissioners offered no explanation of this circumstance at the hearing for want of time, which for them was very brief, and because none of the persons able to throw light upon the matter happened to be upon the stand. The facts were these: The ground being somewhat saturated with recent rains, caused the water level in the gate box about a rod above this boiling to stand upwards of a foot higher than in the little pool. The communication between the two being somewhat obstructed, there was the phenomenon of a boiling up of the water at the outlet. When the communication was made a little more free, the water in the gate box lowered and the boiling became less, and finally, when the gate box was emptied, the boiling ceased, showing that it had no connection with the water in the pond above.

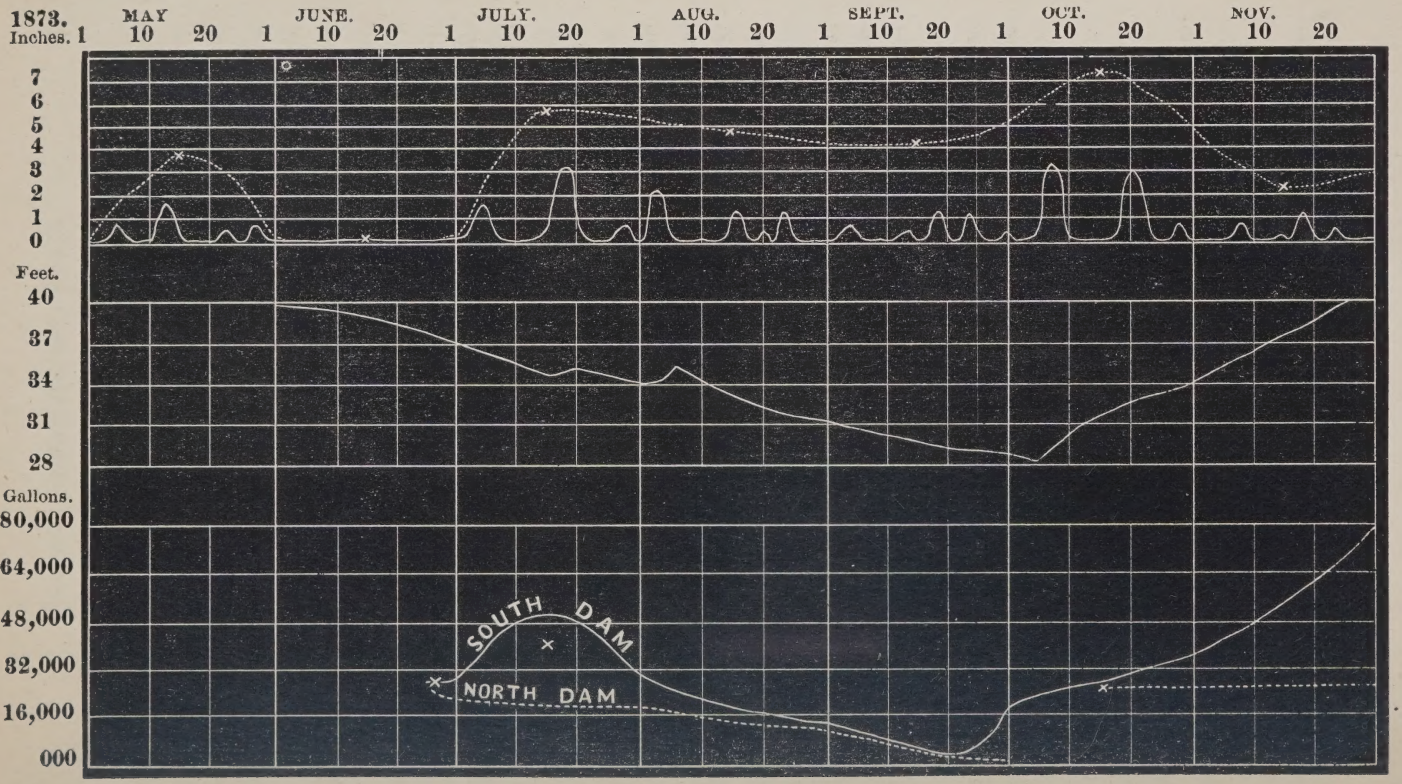
Another circumstance that excited his apprehension was this: He found a crack between the earthwork on the inner or pond side of the dam, and the capping stone of the slope paving which extended about one hundred feet in length, being about an inch and a half wide in the centre, and running to nothing at either end. This, he would have it inferred, showed the instability of the earthwork, while to us it seemed to be nothing more than a movement on the part of the capping stone, following a slip of the paving caused by the waves washing out the earth from underneath; and this was evident from the fact that the depth of the crack was just the thickness of the capping stone.

He called attention to the saturated condition of the lower part of the outer slope of the south dam, asserting, as we understood him, that this showed itself when the pond was first partially filled, and had continued ever since; a sufficient answer to which was that red clover was growing luxuriantly to the very bottom of the slope. Red clover has not usually been classed among the aquatics.

He pointed out what to a cursory observer seemed to be small land slips at the foot of the slope, consequent upon the saturated condition of the earth; to which it was replied that that appearance was delusive, caused by dumping quantities of surplus material. If there had been slips, there must also have been deficiencies from whence the slips occurred, which is not the fact. This explanation, as will be seen, was lost by Mr. Francis, who heard only the statement.

The other matters offered by the City Engineer were mostly assertions as to matters of fact in the mode of construction, all the material portions of which were met with a square denial either by Wm. A. Smith, the Constructing Engineer, who as the inspector of the work was present generally every half day, by the Water Commissioners of 1871, some of whom were present every day, or by Hon. Phinehas Ball of Worcester, the Consulting Engineer, who directed and watched the work in occasional visits.

A diagram, such as is given on the opposite page, was fur-


1873.
Inches.
MAY
JUNE.
JULY.
AUG.
SEPT.
OCT.
NOV.
1
10
20
7
6
5
4
3
2
1
0
Feet.
40
37
34
31
28
Gallons.
80,000
64,000
48,000
32,000
16,000
000
SOUTH DAM
NORTH DAM

nished to Mr. Francis, intended to show the following: In the upper section the crosses connected by the curved line, indicate the total monthly rain-fall, in inches, in the months given in 1873. The lower curved line in the same section gives the times and amounts of the different rains that make up the aggregate. The curved line in the second section shows the height of water in Overlook during the same time, 40 feet meaning full. In the lower section, the two lines exhibit the amount running over the weirs at the foot of the south and north dam respectively, in gallons, made up from the tables before referred to as given in the report of the City Engineer for 1873. We commend the study of this diagram to those interested, as it contains, we think, a fatal objection to the theory that the leak, as it is called, at the south dam, has any tangible connection with the water in the reservoir. The flow of water at the north dam, on the other hand, has an undoubted relation to the height of water in the pond, but from the best evidence in our possession none of it finds its way through or immediately underneath the substance of the dam.

On the 28th of June the following report was received by the Water Committee from Mr. Francis, and we believe has not before been presented to you. It is proper to state that Mr. Francis drew a wrong inference concerning the manner in which the heavy iron pipes were laid under the dam. The barrels of the pipes were laid upon the solid earth, and a small excavation was made for each socket quite the opposite of the mode upon which he comments.

REPORT OF JAMES B. FRANCIS, ESQ., OF LOWELL.

To Messrs. B. Snow, W. H. Vose, C. H. Brown, E. P. Young, D. R. Streeter, Water Committee of the City of Fitchburg:

In your communication of the 4th inst., you request me to give an opinion as to the safety of the dams at Overlook reservoir, in your city, of which some fears have been expressed, and

if, in my judgment, said dams are insecure, to recommend any changes in the structures or modifications thereof, that I may deem advisable.

At a view of the dams, and a subsequent meeting at the City Hall, on the 16th inst., I heard the statements of the Water Commissioners, the resident and consulting engineers, and others concerned in the building of the dams, and also of the City Engineer as to their construction and present condition, and the recent changes in the same. I have also been furnished with copies of the plans and specifications referred to in the contract for the execution of the work.

The south dam consists of an embankment about forty-two feet high in the highest part, and four hundred feet long; twenty-three feet wide at the top, with a slope of two to one on the inside and one and a half to one on the outside, and a longitudinal wall of stone, two feet thick, laid in hydraulic cement in its centre. Three cast iron pipes are laid through the bottom of the lowest part of the embankment to discharge the water, two of them twelve inches in diameter, and the other sixteen inches. There is also at the top of the dam at one end, a waste-way about eight feet wide and four feet deep, intended to prevent the overflow of the embankment.

The north dam is about twenty-two feet high in the highest part, and about one thousand feet long, and of similar section to the south dam, but without the pipes or waste-way.

At the time of my visit, there was some leakage showing itself near the foot of the outer slopes of the embankments. The City Engineer informs me that by gaugings made from the 9th to 16th inst., he found the flow at the foot of the north dam to be at the rate of 21,626 gallons per day, and at the foot of the south dam 45,575 gallons per day. It is not probable that this all leaks through the dams; part of it, and at the north dam, I think a large part, percolating through the natural ground on which the dams are built. Comparing the gaugings made last year with the above, allowing for the difference in the position of the gauge at the north dam, and other circumstances explained to me by the City Engineer, I do not find that there is any sensible change in the amount.

From the uniform purity of the water in the reservoir, there can be but little sediment; otherwise I should expect the leak would gradually diminish. As it is, it will probably continue with-

out much change; but I see nothing in its amount or in the circumstances attending it, to excite any apprehension for the safety of the dams.

I am informed that there have been several land slips in the outer slope of the embankment of the south dam; they have been of small extent, and in themselves perhaps of little account, but they indicate defect in the construction of the dam. The immediate cause is probably from water, either percolating through the dam from the reservoir, or from rain or melting snow on the surface, or from both these sources combined. It may be due in part to the freezing of the earth when saturated with water, the slips taking place when the frost comes out. So far, the small amount of earth that has moved has not affected the stability of the dam, but it may not always be so hereafter, and means should be taken to prevent it.

The centre wall does not appear to have been relied on as a means of preventing the passage of water through the dam; if it had been, it should have been sunk deeper into the hard gravel and laid with more care than I infer it was, from the statements made.

The embankments, on which the stability of the dams mainly depends, are formed of excellent material, and if the specifications had been strictly followed they must have been of first rate quality. The specifications require that the material is to be "disposed in parallel horizontal layers not exceeding eight inches in thickness. These separate layers are to be thoroughly wetted and compacted by carting over them, or by rolling or otherwise, to the satisfaction of the commissioners." The statements made to me as to the execution of this work were somewhat conflicting, but I gathered from the weight of the evidence that it was not done fully up to the specifications—that there were not inspectors enough employed to exercise that strict supervision over every part of the work, at all hours of the day, which is essential to insure thorough workmanship when done by contract. In a work of this kind, it is not enough that most of it is well done. Every part of it should be well done. In this case, however, the material of which the embankments are made has the quality of puddling itself when in contact with water, and I think there can be no doubt that it is now well consolidated.

The work about the pipes laid through the bottom of the south dam was evidently done with much care. This was necessary, it being the point attended with the most danger. From the state-

ments made, I infer that the sockets rested upon the hard ground, and the spaces between the pipes, and under their barrels, were filled with a soft puddle; and the wall, at the point where the pipes passed through it, was of greater thickness and carried to a depth three or four feet greater than elsewhere. Although perhaps the work is done with all practicable care, I consider the plan defective. There is danger of the water finding a passage under the pipes, from the settling of the puddle; and also of a rupture in the pipe, either from a break resulting from the great weight above and the unequal support below, or a failure at a joint. If the water found a passage under the pipe, it would probably be stopped by the wall, but it is obvious that it would be a comparatively weak place in the embankment. Perhaps at no other point would the full pressure of the water reach the wall, but here, at the greatest depth, it may have it, with only three or four feet of puddle between it and the bottom of the wall.

The pipes, according to the specification, are of extra strength; but cast iron, under such strain, can not be trusted with that absolute certainty essential in this case. A break in a single pipe might cause the destruction of the dam.

I desire to be understood that in the above criticism of the plan adopted for the pipes and their passage through the embankment, I refer more to possibilities than probabilities. In my examination I detected no sign of trouble, and as the work has now stood two or three years, the probability of any occurring is greatly diminished.

I am informed that the centre walls are covered with only eighteen inches of earth, and I observed by the construction of the wasteway, that the water in the reservoir is expected to rise within two or three feet of the top of the embankment. The depth of earth over the wall is not sufficient to prevent the frost reaching it. The earth freezing to the wall and heaving, will fracture the wall. The embankment is also liable to be disturbed and made unsafe to the depth reached by the frost.

The wasteway, I am informed, is unnecessary, from the mode in which the reservoir is supplied, by the conduit from Scott's Brook, and having scarcely any water shed of its own, from which it might be filled to overflowing by heavy rain or sudden thaw. Of this from your local knowledge, you are the best judges. I would remark, however, that as at present constructed, it is a source of weakness whenever the water runs through it, and it should either be discontinued or put in safe condition.

Very few dams of this description can be considered absolutely secure under all the contingencies to which they are liable to be exposed. The solidity of the ground on which these dams are built, the excellent material of which the embankments are made, and the entire safety from overflowing with reasonable care, are points greatly in favor of their security. The objectionable points, in my opinion, are, the pipes, as explained above; the weakness of the outside slopes of the embankments; the deficiency in the height of the embankments above the centre walls; and the wasteway.

I do not see that anything can be done to remedy the defective plan on which the pipes are laid, short of taking them out and replacing them in a less objectionable manner. I say less objectionable, as it is not easy to devise a plan that could be carried out at any reasonable cost, that would be wholly unobjectionable. From the care with which this part of the work appears to have been done, and the length of time that it has stood without indicating any weakness, I am of opinion that the risk attending it, if any, is extremely small; and I do not recommend anything to be done, except to continue the gauging of the water escaping from the foot of the slope, as a means of detecting any important change that may occur.

The outside of the embankment of the South dam, I think should be strengthened, and I recommend that the slope be increased to two feet horizontal to one foot vertical, and that about one-third in height of the lower part of the new material be of rubble stone, to secure perfect drainage at the foot of the slope. I also recommend, in order to protect the centre walls and water line of the embankments from the action of frost, that both the embankments be raised about three and a half feet, so as to give about five feet of earth above the top of the centre walls. The water line not being raised, the width of the top of the bank, when raised, as suggested, might be considerably less than at present.

The wasteway, if not discontinued, should be put in such condition that the water passing through it will not percolate into the embankment.

Very respectfully,

JAMES B. FRANCIS.

Lowell, Mass., June 26, 1874.

On the 22d of May, upon receiving the communication from the City Engineer, the Superintendent was directed by the Commissioners to draw off the water from Overlook as rapidly as consistent with entire safety. This seemed to be demanded at the time by a portion of the public sentiment. The opposite feeling was however immediately developed, in view of the unnecessary waste of water, and the waste gate was closed after having drawn the pond down 2.2 feet. Time has shown the wisdom of the latter action as with slight fluctuations the water level has steadily fallen until Nov. 19, when it stood at 34 feet, a loss of six feet, and this notwithstanding the water of Shattuck Brook has been available since July 17. At this date the water has risen to 36.7 feet.

RAIN-FALL.

The following table gives the rain-fall for each of the twelve months, last past, in inches:

December, 1873,	2.42	June, 1874,	4.60
January, 1874,	3.71	July, "	6.45
February, "	2.48	Aug. "	3.24
March, "	.88	Sept. "	1.81
April, "	3.40	Oct. "	2.46
May, "	3.22	Nov. "	1.98
Total,			36.65

which is 5.35 inches less than the average for a series of years.

SHATTUCK EXTENSION.

The fourteen inch pipe to Shattuck Brook, which was unfinished at the date of the last report, was so far completed that water was first supplied from that source, July 17. Only a very small portion of the water of either that or Scott Brook has run to waste since, but both together have been insufficient to prevent the water level in Overlook from falling, until Nov. 19,

notwithstanding that the rain-fall from June 1, to Nov. 1, was larger than the average for those months. Putting the most favorable construction upon the matter that we dare, we can but re-iterate the opinion expressed in our last report, that the city, in view of the present and prospective consumption, and more especially if the extension to West Fitchburg is to be built, cannot feel itself secure against all reasonable contingencies, until some means of increased storage shall be provided. A dam cannot be made available for the storage of water during the season in which it is built. It must necessarily be prospective. A drought that is to occur in 1876, must be provided for in 1875. Consumers are constantly increasing in numbers, and the consumers of 1876 are the ones that we are to consider in our work for 1875. If our small storage becomes exhausted, we have nothing with which to supplement it. The times are favorable for doing such work as will place us in a condition of absolute safety, and we ought to stop short of nothing less.

LAND DAMAGE.

The Board of Referees, in the cases of damage claimed by land-owners, through which the Shattuck extension is laid, made their award December 11, 1873, amounting in the aggregate to $3,900.00; which was precisely one-half the amount claimed. This covers the right of way for the pipe, and also the right to divert all the water of Shattuck Brook forever, and extinguishes, we believe, the last water right, on a water-shed of 2,800 acres, and we think it should be a source of congratulation that it has been so amicably acquired, and at such a small comparative cost.

WATER TAKERS.

At the date of the last report the number of water takers was 775. Water is now supplied as follows:

Families,	832	Foundries,	2
Stores or offices,	74	Railroads,	1
Stables,	42	Laundries,	2
Manufactories,	12	Bake houses,	2
Boarding houses,	8	Hotels,	2
Churches,	5	Paper mill,	1
School-houses,	6	Brickyard,	1
Water cart hydrants,	3	Dye house,	1
Engine and hose houses,	3	Gas Company,	1
Watering troughs,	2	City Hall,	1
		Total,	1,001

which is an increase of 29 per cent. over last year.

EXTENSION OF MAINS.

As a part of the extensions of last year were incomplete at the date of our report, we here give the total laid during both years.

In 1873:

		Inch.	Feet.			Inch.	Feet.
Beacon	street,	4	603.2	Hazel	street,	4	477.5
Chestnut	"	4	208.	Goodwin	"	4	132.
Goddard	"	4	578.7	Garnet	"	2	888.4
Water	"	8	199.7	Mount Globe	"	4	360.3
Boutelle	"	6	258.	Laurel	"	6	225.8
Lunenburg	"	6	175.4	Laurel	"	4	5.
Myrtle	"	4	131.4	Rollstone	"	2	852.4
Church	"	4	239.	Green	"	6	250.
Prospect	"	10	483.6	Middle	"	4	1,020.
Arlington	"	10	33.5	School	"	4	256.
Charles	"	4	299.5				
				Total for 1873,			7,677.4

There has been laid in 1874:

		Inch.	Feet.			Inch.	Feet.
Otis	street,	4	385.2	Congress	street,	4	270.5
Linden	"	2	380.1	South	"	4	185.
Green	"	6	6.	Kimball	"	6	228.8
Snow	"	4	427.2	Kimball	"	4	815.8
Simonds,	"	6	21.5	Rollstone	"	6	107.6
Marshall	"	4	343.5	Harvard	"	4	170.
				Total for 1874,			3,341.2

Total length of street mains, 89,963.7 feet or a little over 17 miles.

HYDRANTS.

Six hydrants have been set since the last report. Total owned by the city 128; by other parties 10.

SERVICE PIPES.

5,544 feet of service pipe have been laid during the year, of which 2,240.6 feet have been charged to takers and 3,303.4 feet to the city. Total service pipe in use 32,632.6 feet, of which the city owns 15,825.5 feet, and 16,807.1 feet are owned by other parties.

The street mains have been tapped for service pipes in 118 cases without developing an imperfection. Total number of taps to date, 622.

METERS.

There are in use by water takers, 26 meters of the following sizes, of which the city owns 9, and the remainder are owned by takers.

1½ inch,	2	¾ inch,	8
1 "	3	⅝ "	13
	Total,		26

being an increase of 11 during the year.

LEAKS.

Eight leaks, only, have been discovered in the 17 miles of distribution pipe, and they have been repaired by the contractor, Geo. H. Norman, Esq.

By an oversight, we failed to mention in the last report, the "Pressure Regulator," that was located at the foot of Arlington street, connecting the high and low systems. It has performed a good deal of useful service. The making of connection and repairs upon the main pipe from Marshall reservoir to the foot of the common can now be done, while the rest of the city is supplied by

means of this Regulator, thus obviating the necessity of cutting off the whole supply during such operations, as was the case formerly.

On the 17th of October, the city was thus supplied for seven hours, while Marshall Reservoir was completely isolated from the system. This was done to ascertain if, as had been suspected, this reservoir was wasting water by leakage. The loss of water in the time stated was just ¼ of an inch, being equivalent to a waste of about 13,000 gallons in 24 hours. When it is remembered that a considerable proportion of this amount may be fairly charged to evaporation, and that a single open faucet on Main street, will deliver more than double this quantity in the same time, it will be evident that Marshall Reservoir may be looked upon as a successful piece of work. We hoped to try a similar experiment upon Overlook for a longer time, but that reservoir not having been once full since it was projected, we shall be obliged to defer it to a future date.

BLACK BASS.

For the purpose of keeping the water of Overlook as pure as possible and free from insects and other animal matters, seventy Black Bass were placed therein on the 19th of August, taken from Lake Sunapee in New Hampshire. They were from one to three years old and are apparently thriving.

VALUE OF WATER USED BY THE CITY.

The value by the regular rates of the water supplied to all the public buildings and grounds, is	$544
To all the watering troughs,	297
For watering streets,	1,010
	$1,851

For fire purpose, inestimable.

As was said a year ago, "the action of the city council in providing for the payment of the interest on the water debt by taxation, we conceive to be no more than a fair equivalent for the benefits directly and indirectly arising out of the construction of the works."

Four water takers were reported last year as cut off for non-payment of dues. One has been cut off during the year, two have been let on by the payment of $2 each, one by arrangement, and two now remain cut off.

REPAIRS, &c.

By the terms of the contract with Mr. Norman, his responsibility for the repairs of the street mains expires in a little more than one year hence. It seems to us to be for the interest of the City that we should be prepared to assume that work somewhat in advance, and it is an important question whether at the same time the matter of extensions also might not better be done at home. By direction of the Committee on Water, given last spring, we commenced a course of investigation looking to the feasibility and cost of laying our own pipe. This direction was, however, almost immediately recalled, but not before we had learned that a very considerable saving upon every foot of pipe laid was attainable. The materials can all be bought in open market, there is no patent right to interfere, and skilled labor is readily available. The work could be more promptly performed after the authority is granted by the Council, and thus a small portion of the delay, which so frequently annoys the petitioners who are destitute of water, might be prevented.

We here give the items of receipts and expenditure on account of *Construction* and *Maintenance.*

CONSTRUCTION ACCOUNT.

Water Department, for year ending November 30, 1874.

Dec. 1873, To tools and supplies from old acct.,	$2,080	85
Tools and supplies,	25	98
Bills due for service pipe,	370	89
Warren W. Shattuck, land damages and water right,	2,400	00
Martha Shattuck, land damage,	50	00

Dec. 1873,	To Joel Page, land damage,	$250 00
	J. Calvin Spaulding, land damage,	50 00
	Daniel Taylor, " "	600 00
	Albert M. Hill, " "	550 00
	Cost of referring above claims,	60 00
	G. A. Torrey, conveyancing, etc.,	22 00
	T. Arnold, teaming sand,	20 00
	G. K. Paul & Co., pipe,	61 29
	D. Damon, work,	2 50
Jan. '74,	Union Water Meter Co., meter boxes,	70 50
	Wetherbee & Derby, work,	6 35
Feb.	Geo. K. Paul & Co., pipe,	308 11
	Boston Lead Co., pipe,	16 12
	Patent Water & Gas Pipe Co.,	466 36
March,	Union Water Meter Co., meters,	87 30
	H. R. French, elbows,	15 30
April,	Pay-roll,	140 80
	Union Water Meter Co., meters,	72 00
	" " " " "	72 00
	" " " " bands,	80 00
	Walworth Manuf'g Co., stop-cocks,	75 50
	Heywood, Wilson & Co., castings,	22 00
May,	Pay-roll,	180 75
	Heywood, Wilson & Co., castings,	34 00
	Wright & Fairbanks, cement,	15 76
	Union Water Meter Co., bands,	79 65
June,	Pay-roll,	185 80
	Geo. K. Paul & Co., pipe,	160 42
	James Edmands & Co., scotch pipe,	350 63
	Boston Lead Co., pipe,	14 41
	Boston Machine Co., valves,	18 21
	Union Water Meter Co., meters,	72 00
	Smith & Co., freight,	6 75
	B. C. & F. R. R. Co.,	38 44
	Heywood, Wilson & Co., castings,	28 20
	Warren Shattuck, work on trench and dam,	332 50
	W. E. Clapp, teaming,	32 20
	J. M. Peck & Co., horse hire,	19 00
July,	Pay-roll,	239 50
	Heywood, Wilson & Co., castings,	64 00

July,	To Wright & Fairbanks, cement,	$9 00
	Union Water Meter Co., bands,	70 50
	" " " " meters, etc.,	98 00
	" " " "	3 25
Aug.,	Pay roll,	176 00
	Rollstone Machine Co.,	3 00
	Seth L. Lowe, black bass,	60 00
	Union Water Meter Co., meters,	94 00
	Geo. K. Paul & Co., pipe,	306 24
	Smith & Co., freight,	15 10
	Parks & Carpenter, pipe,	24 94
	Heywood, Wilson & Co., castings,	14 00
Sept.,	Pay roll,	185 70
	Heywood, Wilson & Co., castings,	39 67
	Union Water Meter Co.,	53 50
	Patent Water and Gas Pipe Company,	227 14
October,	Pay Roll,	187 70
	Wright & Fairbanks, cement,	18 33
	G. B. Knowlton, shovels,	10 99
	Heywood, Wilson & Co., castings,	20 00
	Union Water Meter Co., bands,	15 00
Nov.	Pay Roll,	164 50
	Boston Lead Co., pipe,	16 36
	Union Water Meter Co., bands,	26 25
	Heywood, Wilson & Co., castings,	22 00
	W. A. Hardy, stop and waste cocks,	132 74
	Union Water Meter Co., bands,	37 00
	A. B. Gibbs & Co., labor,	54 50
	Parks & Carpenter, pipe, etc.,	22 78
	Lucius Aldrich, lumber, etc.,	17 60
	Railroad fares, etc.,	14 33
	⅔ superintendent Towne's salary,	1,000 00
	¾ commissioners' salary,	395 62
	Due Geo. H. Norman, for street main pipes, laid in the streets in 1873 and '74, $14,114 35	
	Less repairs, etc., made by water department, 130 83	
		$13,983 52

Nov.	Geo. H. Norman, for Shattuck extension 8,300.86 ft. of 14 inch pipe, $3.00 per foot,		$24,902 58	
	Less release on inlet,	100 00		
	Special rate on 157 feet,	157 00		
	Deficient covering,	250 00		
	4 gates,	100 00	607 00	
			$24,295 58	
	5 months interest,		607 39	
	Extra work on extension,		1,000 00	
				$53,270 30

Cr.

By cash received for service pipe,	$2,301 21	
Bills due for service pipe,	207 73	
Tools and service pipe on hand,	1,848 92	
Balance carried new account,	48,912 44	
		$53,270 30

With the approval of the commissioners, $20,000 on account was paid Mr. Norman, Sept. 4, 1874. This sum with interest is to be deducted from the amount of Mr. Norman's claim.

MAINTENANCE ACCOUNT.

Water Department, year ending Nov. 30, 1874.

Dec. 1873,	To G. F. P. Day, clerk hire,	$31 17
	Labor account,	58 75
Jan. 1874,	F. W. Towne, paid for sundries,	10 80
	Labor account,	66 25
Feb.	Henry Jackson, postage,	4 67
	Labor account,	60 00
	F. W. Towne, paid for sundries,	15 89
March,	G. B. Knowlton, pipe,	7 54
	Labor account,	74 00
June,	F. W. Towne, paid for sundries,	10 09
	G. F. P. Day, clerk hire,	10 25
	Henry Jackson, postage, &c.,	7 37

	J. M. Francis, examination of reservoir,	$150 00		
	W. A. Smith, examination of reservoir,	12 00		
	Phinehas Ball,	26 10		
	J. M. Peck & Co., horse hire,	4 50	192 60	
	F. E. Sheldon, clerk hire,		11 00	
July,	John Garfield, printing,		18 00	
	W. H. Lowe, jobbing,		4 83	
	F. W. Towne, paid for sundries,		3 90	
Nov.	J. M. Peck & Co., horse hire,		9 50	
	B. A. Melvin, blacksmithing,		11 52	
	⅓ Superintendent Towne's salary,		500 00	
	¼ Commissioners' salary,		131 87	
				1,240 00
	Balance carried to Sinking Fund,			9,165 81
				$10,405 81

Cr.

Nov. 30,	By received from Water rates,	$9,488 70	
	By received from A. M. Hill, rent of pasture,	100 00	
	By received from L. Kinsman, rent of pasture,	25 00	
	By received from sale of lumber,	14 19	
	Bills due,	777 92	
			$10.405 81

We estimate the cost of maintenance for the next fiscal year as follows :

Superintendent's salary, ⅓,	500 00	
Commissioners' " ¼,	150 00	
Labor,	500 00	
Sundries,	100 00	
		$1,250 00

JABEZ FISHER,
LUCIUS ALDRICH,
STEPHEN SHEPLEY, } *Water Commissioners.*

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